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Science in Social Criticism

Before "science" became a household word there existed an intellectual quality and an attitude that are not confined to science. They are the quality and the attitude of criticism. A *critical* attitude toward facts and explanations generally preceded discovery and was often the key to discovery. Among many fundamental consequences of the critical attitude are two that we may here emphasize: the mind may observe (1) that a given object or condition is not *where* it ought to be according to current interpretation, and (2) that a given object or condition may not be what it *seems* to be. Thousands of discoveries have sprung out of these two elementary observational and critical approaches.

When experiment was joined to the critical approach, creative scientific work developed two powerful motors. The first was controlled techniques and instrumentation in the laboratory and the field. The second was the use of inductive and deductive methods in analyzing observations of laboratory and field. Deduction became especially valuable because it far outran observation and opened new avenues in the mind itself. Thus an earlier critical approach was supplemented by powerful engines of thought that were widely and consciously taught and operated in schools and industries. Criticism was intensified in all fields of knowledge by its obvious fruits and its conscious and systematic application in science.

This may not be the most dangerous period of civilization in 2,000 years but most of us think it is one of the most dangerous. It is certainly the most complex. Every parochial condition is temporarily overshadowed. Two billion people are swept along in a single flood. All sorts of questions are asked about the future. The uncritical prophets are sketching an apocalypse that has more Hollywood than sense in it or promising the earth and the fullness thereof to everybody without troubling to look at the arithmetic of it. The critical spirit is having a hard time. On every hand men speak of uncontrollable elements in terms of "I think" when they should say "I guess."

Science will not cure the world of its present sickness, but it can help powerfully. It can remind men how past advances were made in many sectors of knowledge and experience. It can fortify man's critical spirit in an hour of deepest need. Its orderly approach to many material problems can be more widely extended. It has made a spiritual contribution to living and thinking that grows more apparent the more deeply men reflect upon it.

After the war a new dynamism of peace will be urgently needed. We must seek to make it as powerful spiritually as the dynamism of war. Our total stock of precious natural resources, and far more precious humanity, needs going over in a critical spirit in order that men and women may still have that chance in life that gives our America its unique historical stamp. Without science in all its best connotations this work will not be well done. That means critically done but also done experimentally as new forces and conditions of the post-war world drive us forward, guided by the stars of our ancestors but not by their dead campfires.—ISAIAH BOWMAN, President of the A.A.A.S.

Another Serious Shortage

A thousand copies of the 1943 January and March issues of *The Scientific Monthly*, and about half as many of the February, April and May issues, are required at once to supply back numbers to an unexpectedly large number of new subscribers.

In a sense, this shortage is related to the war effort of the United States, because 200 of the required copies of each issue of the *Monthly* are

for the technical libraries of American Air Force training centers. These copies of the magazine will be made available to tens of thousands of young men who in 41 of our 48 states are being prepared to defend our civilization. Of the remainder, many copies will go to men already serving in our armed forces who, amid the grim realities of war, desire to keep in touch as much as possible with the finer things of life for which they are fighting.

In order to expedite the solution of the problem the Association is facing and to avoid resetting several hundred pages of *The Scientific Monthly*, it is hoped that those who have the back copies in question, and are not preserving them to make complete volumes, will notify the Office of the Permanent Secretary of the issues that they are able to provide. Upon receipt of a postal card specifying what copies are available a wrapper and postage will be sent to the donors to facilitate shipment. A considerable number of copies of the January 8, January 29 and February 19 issues of *Science* are also needed.—F.R.M.

Science Mobilization Bill (S. 702; H.R. 2100)

A bill known as *Science Mobilization Bill* has been introduced in the U. S. Senate by Senator Harley M. Kilgore, of West Virginia, and in the U. S. House of Representatives by Representative Wright Patman, of Texas.

At the meeting of the National Academy of Sciences, held in Washington on April 26–27, mimeographed copies of the following letter were circulated among scientists.

United States Senate
Committee on Military Affairs
April 23, 1943

Dear Sir:

As one who is devoting his major efforts to a selected field in science, I know you will be directly interested in the Science Mobilization Bill (S. 702, H.R. 2100) recently introduced in both houses of Congress. While it has always been recognized that the strength and welfare of our nation is largely dependent upon the progress and achievements of our science and technology, appropriate participation of the scientist in the conduct of our government has not, as yet, been realized. Science now can, and should, function as an independent and effective entity in government on an equal plane with commerce, agriculture, labor, justice and other cabinet offices.

The point of view of men of science has been expressed in a resolution adopted by the council of the American Association for the Advancement of Science who resolved "that aggressive governmental support of scientific work was [is] essential to any sound program of planning for the future national welfare and is essential if this country is to do its full part in the further advance of civilization and if it is to enjoy its proper share in the benefits of this advance." I firmly believe that both the interest of our nation at war and the ideals expressed in the above resolution will be best served when the organization contemplated in this bill becomes a reality.

I am enclosing a copy of the bill and a brief resume of its salient features for your consideration. You will note that its provisions are so planned as to provide for the maximum utilization of science and technology in both war and peace. We, in Congress, need the advice and counsel of all persons who can with competence and foresight evaluate the provisions of this bill. Therefore, I shall greatly appreciate your comments and recommendations regarding it.

Sincerely yours,
(signed) H. M. Kilgore, U.S.S.

It was inferred by the scientists who commented on the foregoing letter that the Council of the Association had passed a resolution in support of the Kilgore-Patman Bill. *However, the Council of the Association has not passed any resolution whatever in reference to the Science Mobilization Bill, nor even considered it.* The quotation in Senator Kilgore's letter was from a resolution passed by the Council of the Association on December 29, 1934, because, by Executive Order, the President of the United States had reduced by 50 per cent. the funds available for the operations of such bureaus as the National Bureau of Standards, the U. S. Geological Survey, the U. S. Coast and Geodetic Survey, and the U. S. Bureau of Mines. As a result, it became necessary to make drastic reductions in their scientific staffs, the salaries of those remaining were cut by 15 per cent., and their scientific productivity was seriously curtailed. Under these conditions the Council of the Association passed a resolution pointing out the importance of scientific work for social progress and the desirability of its continued support by the Government. The Kilgore-Patman bill raises quite different questions.

AAAS—Gibson Island Research Conferences

Each year since 1938 special research conferences on chemical and related problems have been held at Gibson Island, Maryland, under the auspices of the Association. Ten such conferences, each continuing from Monday morning to Friday evening, will be held this year beginning on June 14 and closing on August 20. The subjects of the conferences for this summer in the order in which they will be presented are: (A)

Frontiers in Petroleum Chemistry, (B) Catalysis, (C) Organic High Molecular Weight Compounds, (D) Textiles, (E) Strategic Materials, (F) Hormones, (G) Vitamins, (H) Chemical Growth Factors, (I) Corrosion and (J) Instrumentation. For further information, write to Dr. Neil E. Gordon, Wayne University, Detroit, Mich.

Strategic Materials is the subject of a conference that will be held from July 12 to July 16, inclusive, under the chairmanship of Dr. Robert Calvert, Chief Chemist of the Johns-Mansville Corp. The program is as follows:

Sugars in Wartime. A. P. Hellwig and B. F. Buchanan.

Newer Knowledge of the Chemistry of Bread. J. C. Baker.

Food and Nutrition in Relation to War Adjustment. F. G. Boudreau.

Fermentation as a Tool in Industrial Utilization of Farm Products. R. D. Coghill.

Starch Adhesives. L. T. Smith.

Starch Industry. W. B. Newkirk.

Synthetic Rubber. E. V. Murphree.

Dehydrated Foods. R. S. Hollingshead.

Quick Frozen Foods. E. T. Gibson.

Non-ferrous Metals. Colin G. Fink.

Can Makers Wartime Problems. J. A. Stewart.

Hormones is the subject of the conference for the following week, July 19–23, which will be held under the chairmanship of F. C. Koch, of Armour and Company, and the vice chairmanship of H. Jensen, of the Research Laboratories of The Upjohn Company. The program of this conference is as follows:

The Isolation and Chemistry of Anterior Pituitary Hormones Influencing Growth and Metabolism. A. White.

The Isolation and Chemistry of the Anterior Pituitary Gonadotropic Hormones. B. Chow.

The Physiology and Chemistry of the Posterior Pituitary. G. W. Irving.

The Influence of the Anterior Pituitary on Growth and Metabolism. C. N. H. Long.

The Isolation and Chemistry of the Adrenal Hormones. M. H. Kuizenga.

The Chemistry of Insulin. H. Jensen.

The Physiological Action of Insulin. F. D. W. Lukens.

The Physiological Action of the Adrenal Hormones. Dwight J. Ingle.

The Chemistry and Physiology of the Thyroid. W. T. Salter.

The Chemistry and Physiology of the Parathyroid. Thomas R. Wood.

The Isolation and Chemistry of the Sex Hormones. T. F. Gallagher.

Synthesis of the Sex Hormones. E. Schwenk.

The Isolation and Chemistry of Chorionic Gonadotropin and Pregnant Mare Serum Gonadotropin. S. Gurin.

The Gonadotropic Influence of the Anterior Pituitary. H. L. Fevold.

The Physiology of Chorionic Gonadotropin and Pregnant Mare Serum Gonadotropin. Louis Levin.

Physiology and Clinical Aspects of the Sex Hormones. Speaker to be announced.

Anti-hormones. K. W. Thompson.

General Summary. F. C. Koch.

Chemical Growth Factors is the subject of the conference that will be presented during the week of August 2–7, under the chairmanship of Dean Burk, National Institute of Health, and the vice chairmanship of William J. Robbins, Director of the New York Botanical Garden. The program is as follows:

Sulfur Compounds in Relation to Growth and Chemical Configuration. S. P. Reimann and G. Toennies.

The Enzymatic Control of Growth. Van R. Potter.

Growth Factors for the Gonococcus. R. G. Gould.

Organic Inhibitors of Cellular Metabolism. C. J. Kensler.

Bactericidal Products from Molds and Soil Bacteria. J. C. Hoogerheide.

Chemical Factors in Inflammation and Cellular Injury. Valy Menkin.

Heterotrophic Utilization of Carbon Dioxide. C. H. Werkman.

H_2 and CO Inhibition of Growth and Nitrogen Fixation; Growth Factors for Autotrophic Bacteria. P. W. Wilson and R. H. Burris.

Chemical Structure and Vitamin Activity for Plants. William J. Robbins.

Growth Factor Requirements of Isolated Roots. James Bonner.

Microbiological Aspects of Riboflavin. J. Foster.

Molecular Configuration and Physiological Activity of Growth Substances. P. W. Zimmerman.

Some Abiotic Tumefactions of Plants. P. R. White.

Support of the War Efforts of the United States

Dr. James B. Conant and Dr. Leonard Carmichael, who are the second of four committees appointed by the Executive Committee to prepare resolutions on subjects of importance and wide general interest, have prepared a "tentative draft" of a resolution on "Support of the War Efforts of the Government of the United States" by scientists. Since the Association is interested in practically all of the natural and social sciences, in a real sense it represents American science. The resolution has been sent to the Council for its consideration and probable approval, except possibly as to precise wording. It

is presented here for the consideration, comments and criticisms of the members of the Association, which should be sent to the Office of the Permanent Secretary.

Dr. Conant, a chemist, has been President of Harvard University since 1933. He was a major in the Chemical Warfare Service of World War I and he is now Chairman of the National Defense Research Committee, under whose direction a large part of the scientific research in the support of the war in this country is being carried out. No one has a better opportunity of knowing the attitude of scientists toward the war efforts of the United States and what scientists are accomplishing. Dr. Conant has received many honorary degrees and medals for scientific work which it is not necessary to mention, and holds several positions of importance in the scientific and educational life of our country. He has been a member of the Association since 1918 and a fellow since 1925.

Dr. Leonard Carmichael, a psychologist, has been President of Tufts College since 1938. He is serving the Government as Director of the National Roster of Scientific and Specialized Personnel, which is by far the most complete and detailed census of scientists that has ever been made in this country. It contains the names and qualifications of approximately 560,000 American scientists. Dr. Carmichael has been a member of the Association since 1924 and a fellow since 1930. From 1937 to 1941 he was Secretary of the Section on Psychology.

The Resolution

The scientists of the United States, through their largest general organization, the American Association for the Advancement of Science, take this opportunity to reaffirm their unqualified support of the war against the Axis powers, which must end in the unconditional surrender of our enemies.

We are not unaware of the sacrifices which will be required before the goal of our national effort can be attained. As scientists who have given their lives to the advancement of learning, we contemplate with sorrow the effect of total war on the scientific progress of mankind. While in certain restricted areas improvements in instruments of war go hand in hand with advances in applied science, taking the picture as a whole, no one can believe that these years of total war will in the future be known as years in which the creative activities of the human mind have prospered in the arts, the letters or the sciences. Nevertheless, we have only one concern for the present, namely, that the scientific effort of the United States be dedicated completely and wholeheartedly to the end of achieving total victory in the minimum span of time. Scientific research as usual is no more compatible with the total war than business as usual. The sooner this agony of the war is over, the sooner the scientists of the world can resume their normal tasks.

No citizens of the United States have more at stake in this fight for freedom than the scientists. In the last three hundred years, the progress of science has gone hand in hand with the development of individual initiative and personal freedom. We have contemplated with horror the suppression of free inquiry in the totalitarian lands and the subordination of academic institutions to the tyranny of party government. We know that unless America can be free in the years ahead profoundly significant advances in sciences will not be forthcoming and our professions cannot for long endure.

Therefore, Be it Resolved by the American Association for the Advancement of Science, That we unqualifiedly support the war efforts of the Government of the United States and stand ready to make any sacrifices as citizens and as scientists which our military leaders may demand.

Two of the 137 Affiliated Societies

With a brief history of the American Chemical Society in the April issue, the BULLETIN began a survey of American science as it is expressed by its 137 affiliated societies. This issue continues the survey with historical sketches of two other societies, the American Mathematical Society and the American Anthropological Association. It is appropriate that mathematics and anthropology should appear early in this series because these subjects have had prominent places in the programs of the Association from its founding in 1848. Moreover, these societies have had the status of affiliated societies since the relationship was formally established in the new Constitution that was adopted in 1920.

American Mathematical Society

The American Mathematical Society was founded on November 24, 1888, through the efforts of Dr. Thomas A. Fiske, then a young instructor at Columbia University. The original group consisted mainly of mathematicians from New York City and the organization was known as the New York Mathematical Society. However, in 1894 the Society was enlarged to include mathematicians from a wider area and its name was changed to the American Mathematical Society. By 1895 the membership had risen to 260 and it gradually increased until 1920, when there were about 750 members. As the result of a vigorous campaign to interest all mathematicians in the work of the Society, the membership rose to 1,250 in 1923. In 1933 it was 1,783, and at present there are more than 2,500 names on the rolls. While the major portion of the members reside in the United States and Canada, the Society has foreign members from most of the countries of the world.

In September, 1938, the Society celebrated the semicentennial of its founding in a meeting held at Colum-

bia University which was attended by more than 700 persons. Ten important addresses by outstanding members of the Society were delivered and later published as one of the two volumes of Semicentennial Publications. The other volume was a History of the Society by Prof. R. C. Archibald of Brown University. A notable feature of the celebration was the active participation of the founder of the Society, Prof. Fiske, who has now retired and is living in Poughkeepsie, N. Y.

The primary object of the Society is to promote mathematical research. Meetings are held for the discussion of research papers and an extensive publication program is supported. The Society holds two national meetings each year, one at the Christmas holiday season, usually in conjunction with the meetings of the American Association for the Advancement of Science, and the other in the summer. In addition, three meetings are held in New York City, two in the midwest, and two on the Pacific coast. At all of these meetings mathematicians are given an opportunity of presenting short papers embodying the results of their current research. An additional feature of the summer meeting is a series of Colloquium Lectures by a leading mathematician on a problem of current interest in research. At the Christmas meeting there is usually delivered a Josiah Willard Gibbs Lecture, founded in honor of Gibbs, one of the foremost scientists America has produced. The purpose of these lectures is to present relations of mathematics with other fields, and they are usually delivered by representatives of related branches of science.

The Society maintains four classes of membership:

(1) *Ordinary membership.* Annual dues are $6 for the first three years and $8 thereafter.

(2) *Contributing membership.* An ordinary member may become a contributing member upon paying dues of at least $15 per year.

(3) *Institutional contributing membership.* The minimum annual dues are $25 and the membership includes the privilege of nominating to ordinary membership one person for each $25 contributed.

(4) *Sustaining membership.* The minimum annual dues are $100. Sustaining members receive the *Bulletin, Transactions,* and *Mathematical Reviews,* and have the privilege of nominating one or more persons to ordinary membership in the Society.

The Society has reciprocity agreements with a number of the foreign mathematical societies whereby, under certain restrictions of residence, members in either organization may attain membership in the other by the payment of the initiation fee and one-half the regular annual dues.

The Society publishes the following journals:

(1) The *Bulletin of the American Mathematical Society* is published monthly, is the official organ of the Society, and is sent to all members. One of its functions is to report the official actions of the Society and the details of its meetings. In addition, it publishes short research papers and abstracts of all papers which are read before the Society. The first number of the *Bulletin* appeared in 1891 and the 49th volume is being published this year. Each year approximately 1,000 pages are printed.

(2) The *Transactions of the American Mathematical Society* is published bimonthly and is devoted solely to the publication of new investigation in pure and applied mathematics. The *Transactions* was founded in 1900. Since 1935 two volumes have appeared each year; the 53d volume is now being published.

(3) *Mathematical Reviews,* now in its fourth volume, is sponsored by the Society, the Mathematical Association of America, the London Mathematical Society, and a number of other foreign scientific groups. It is published monthly and gives abstracts of all of the current mathematical literature. As an additional feature, subscribers may obtain, at cost, microfilms and photoprints of mathematical papers which have been reviewed in the journal.

(4) The *Colloquium Publications* is a series of books containing the Colloquium Lectures on advanced and new mathematical subjects. Twenty-eight volumes have been published.

The Society shares with The Johns Hopkins University in the publication of the *American Journal of Mathematics,* and is also represented on the Board of Editors of the *Annals of Mathematics* and the *Duke Mathematical Journal.*

This spring the Society will inaugurate a new series of monographs to be known as *Mathematical Surveys.* Each book of this series is to be a careful exposition of some field of research. The monographs will differ from the books of the *Colloquium Publications* in that the former will be largely expository, while the latter will consist mainly of new material.

Three prizes are awarded by the Society: (1) the Bôcher Memorial Prize in Analysis; (2) the Frank Nelson Cole Prize in Algebra; (3) the Frank Nelson Cole Prize in the Theory of Numbers. Each of these prizes is awarded once in five years for a notable research memoir which has appeared in a recognized journal published in the United States or Canada. The recipient must be a member of the Society and must not be more than 50 years of age. The next award will be that of the Bôcher Prize in Analysis for papers published during the period 1938–1942. The Cole Prizes were founded in honor of Prof. Frank Nelson Cole on the occasion of his retirement, after 25 years of service, as Secretary of the American Mathematical Society and Editor of the *Bulletin.*

At the outbreak of the war in Europe the Society appointed a War Preparedness Committee which was under the leadership of Prof. Marston Morse of the Institute for Advanced Study. This committee did notable work in giving advice to mathematicians and others on methods by which mathematics could be employed in the solution of various research problems in connection with the war. Its Subcommittee on Education for Service prepared a valuable report regarding the mathematical programs which should be followed by colleges and secondary schools in order to better fit students for effective participation in the war effort. Now that we are actually engaged in

war, this committee has been replaced by a War Policy Committee which will formulate broad policies to be followed by the mathematicians during the difficult days which are ahead. It is hoped that scientific meetings can be continued during the war so that mathematicians may have opportunities for the discussion of research problems and of the difficult questions which confront departments of mathematics. Mathematics is playing such an important role in this war that it is necessary to have a free interchange of ideas in all branches of pure and applied mathematics.—J. R. Kline, Secretary.

The American Anthropological Association

Interest in Anthropology is of long standing in this country, but formal organizations devoted to fostering research in this field were not founded until the 1840's. The American Ethnological Society, which recently celebrated its Centennial, and later the Anthropological Society of Washington (1879) and the Philadelphia Anthropological Society, were organized to study the history of man, particularly in the New World.

The localized interests of these societies gradually widened, and in 1882 the need for a more nation-wide organization was recognized by the creation of an anthropological section of the American Association for the Advancement of Science. Early in 1899, this group took over a journal which had for some years been the organ of the Anthropological Society of Washington, and issued it as the *American Anthropologist, New Series.* The journal is now in its 45th volume, and some 60 supplementary *Memoirs* have been issued. The American Anthropological Association was formally founded three years later, in 1902, preliminary steps having been taken in the autumn of 1901.

The purposes of the Association are "to promote the science of Anthropology; to stimulate the efforts of American anthropologists; to coordinate Anthropology with other sciences; to foster local and other societies devoted to Anthropology; to serve as a bond of union among American anthropologists and American anthropological organizations present and prospective; and to publish and encourage the publication of matter pertaining to Anthropology." The original constitution was adopted in 1902; amended in 1916 and again in 1941. The present constitution provides for two classes of membership, Members and Life Members. The annual dues for regular members is $6.00, which includes subscription to the *American Anthropologist,* a quarterly publication, and the *Memoirs* which are issued irregularly as supplementary volumes. Libraries and institutions may subscribe for the journal at the same rates, but do not have voting privileges.

The membership grew rather slowly up to 1925 and more rapidly since then, the present membership (including libraries and institutions) being around 1,100. An annual meeting for the transaction of business and the presentation of scientific papers is held at the close of the calendar year. Whenever possible, alternate meetings of the Association are held in conjunction with the winter meetings of the A.A.A.S. In addition, numerous local societies have frequent meetings of their own, and the Central States Branch, which was authorized a few years ago, has an annual spring meeting in the Midwestern area.

The Association has affiliations with the American Association for the Advancement of Science, the National Research Council, the Social Science Research Council, the American Council of Learned Societies, and the Inter-American Society for Anthropology and Geography. Through representatives to these organizations and through membership on their committees, anthropologists are able to contribute materially to the coordination of the various disciplines. Indeed, with its interests in the physical and biological aspects of man, as well as in his social and cultural life, anthropology is in a position to play a leading role in the coordination of scientific and historical knowledge.

The onset of the war found the anthropologists prepared to make a contribution on many fronts. At the December, 1941, meeting at Andover, Mass., an evening was devoted to discussing the role of anthropology and anthropologists in the world crisis. Soon anthropologists began to be called to Washington in increasing numbers until by the time for the annual meeting of 1942, almost 100 anthropologists were in government service. The request for cancellation of all meetings not directly connected with the war effort was met by holding a business meeting in Washington, D. C., for which no travel was involved.

Over one-half of the professional anthropologists in this country are directly concerned in the war effort, and most of the rest are doing part-time war work. The comprehensive knowledge of the peoples and cultures of the world which anthropologists have gathered through field research has proved of great value to both the Army and the Navy, and to the various war agencies. The Association has cooperated in setting up the Ethnogeographic Board and the Committees on the Anthropology of Oceania and Africa and the Committee for Latin-American Studies. At the December, 1942, meeting a committee was appointed to make recommendations to the Army board engaged in setting up curriculums for the Army college training program. Plans are underway to organize anthropological knowledge for the basic problems of the post-war period, particularly in areas where native peoples or different cultures are found.

With such a large proportion of the professional anthropologists in governmental service, the Association has been concerned with the problem of maintaining teaching and research in the colleges and universities. If the war should last for several years there will be a considerable gap in the training of graduate students. However, with the large number of students who will encounter practical problems of dealing with peoples of different cultures in various parts of the world, there will continue to be a considerable number of students eager to learn more about the history and science of man after the war.—Fred Eggan, Secretary.

A Pattern for Interstate Cooperation

West Virginia University has had a two-year medical course at Morgantown, W. Va., but wished to develop a four-year course. The Medical College of Virginia (Richmond, Va.) has an established four-year medical course, but war conditions have restricted attendance of medical students. The administrative authorities of the two institutions have worked out a plan of cooperation. The legislature of West Virginia, under advice of the State Medical Association and the faculty and trustees of the West Virginia University, has voted, approved and provided funds whereby to transfer "some fifteen to twenty medical students annually to Richmond for the last two years of their instruction." This plan is not expected to reduce the number of Virginia students who can attend the Medical College of Virginia. The plan is expected to provide extended service to the Medical College of Virginia as well as to provide West Virginia with the last two years of medical school without duplication of needed buildings, equipment and faculty.

This plan is suggestive of other cooperation in higher education. It seems likely that state boundaries might often be crossed helpfully if problems were approached in the spirit of full mutual cooperation.—OTIS W. CALDWELL, General Secretary.

The Association from 1891 to 1900

At the beginning of the decade 1891–1900 nearly all major branches of science appeared to be nearing perfection. It was thought, of course, that another decimal place in observational and experimental data would be desirable, but all the basic principles appeared to be thoroughly established.

In mathematics, the point set theory had been evolved and with it rigorous reasoning had been introduced into analysis. In physics, the laws of mechanics were complete, the electromagnetic theory had been established and the law of the conservation of energy had been accepted. The atomic theory provided a safe general foundation for chemistry. Uniformitarianism had been accepted in geology and an upper limit to the age of the earth had been set by the contraction theory of the sun's radiation, Darwin's theory of evolution had been generally accepted by biologists, the germ theory of disease had been established, and Adam Smith and Herbert Spencer had laid the foundations of economics and social science. Science had been victorious! Happy days were at hand!

Alas for the dreams that finality in science had been reached! In 1892 Oswald brought to light the profound importance of the paper by Gibbs; in 1894 Bateson discovered that variations in living organisms proceed by finite jumps, and a little later de Vries announced his mutation theory; in 1895 Roentgen discovered X-rays; in 1898 Ross worked out the life cycle of the malarial parasite in human malaria; and in 1900 Reed demonstrated the mode of transmission of yellow fever.

The presidential addresses and papers presented at the meetings of the Association during the decade under consideration on the whole gave little evidence that a period of transition in science was at hand. In his retiring presidential address in 1891, Lincoln Goodale (botany) discussed various useful plants of the future—grains, vegetables, fruits, etc. He anticipated none of the remarkable achievements in plant breeding that have already been realized.

Albert B. Prescott, in his presidential address in 1892, said: "The atomic theory has more and more plainly appeared to be the central and vital truth of chemical science. . . . The atomic theory has come to be more than facile language, more than lucid classification, more than working hypothesis, it is *the definition of the known truth in the existence of matter.*"

At the annual meeting of the Association held in Madison, Wis., in 1893, there were two important papers on geology, the retiring presidential address by Joseph LeConte on "Theories of the Origin of Mountain Ranges" and the address of Charles D. Walcott, Vice President for the Section on Geology and Geography, on "Geologic Time as Indicated by the Sedimentary Rocks of North America." LeConte, after reviewing all the principal theories of the cause of mountain range formation, closed his discussion with the conclusion:

> After this rapid discussion of alternative theories in which we have found them all untenable, we return again to the contractional theory, not indeed with our old confidence, but with the conviction that it is even yet the best working hypothesis we have.

Perhaps not much more could be said at the present time. But Walcott's concluding paragraph was:

> In conclusion, geologic time is of great but not indefinite duration. I believe that it can be measured by tens of millions, but not by single millions or hundreds of millions of years.

This "conclusion" assigns a limit that is less than one-half of one per cent of the age of the earth as now determined from radioactive elements occurring occasionally in its rocks. It was at this same meeting that Henry F. Osborn, Vice President for the Section on Zoology, said in conclusion:

> This capacity of similar development under certain stimuli is part of the law of mammalian evolution, but this does not decide the crucial point whether the stimulus is spontaneous in the germ or inherited from the parent. I incline to the latter opinion.

Perhaps the conclusion of greatest present interest announced in vice presidential addresses presented at the meeting in 1894 was that of Franz Boas, who concluded his address as Vice President for the Section on Anthropology and Psychology with the words:

> . . . The average faculty of the white race is found to the same degree in a large proportion of individuals of all other races, and although it is probable that some of these races may not produce as large a proportion of great men as our own race, there is no reason to suppose that they are unable to reach the level of civilization represented by the bulk of our own people.

At the annual meeting held in 1895, Daniel G. Brinton concluded his retiring presidential address on "The Aims of Anthropology" with the following stirring paragraphs:

> To be sure, there is less physical suffering, less pain. War and famine and bitter cold are not the sleuth-hounds that they once were. The dungeons and flames of brutal laws and bigoted religions have mostly passed away. Life is on the average longer, its days of sickness fewer, justice is more within reach, mercy is more bountifully dispensed, the tender eye of pity is unscarfed.
>
> But under what difficulties have these results been secured! What floods of tears and blood, what long wails of woe, sound down the centuries of the past, poured forth by humanity in its desperate struggle for a better life! A struggle which was blind, unconscious of its aims, unknowing of the means by which they should be obtained, groping in darkness for the track leading it knew not whither.
>
> Ignorant of his past, ignorant of his real needs, ignorant of himself, man has blundered and stumbled up the thorny path of progress for tens of thousands of years. Mighty states, millions of individuals, have been hurled to destruction in the perilous ascent, mistaking the way, pursuing false paths, following blind guides.
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> Now anthropology steps in, the new Science of Man, offering the knowledge of what he has been and is, the young but wise teacher, revealing the future by the unwavering light of the past, offering itself as man's trusty mentor and friend, ready to conduct him by sure steps upward and onward to the highest summit which his nature is capable of attaining; and who dares set a limit to that?
>
> This is the final aim of anthropology, the lofty ambition which the student of this science deliberately sets before himself. Who will point to a worthier or a nobler one?

Officers of the Association

President, Isaiah Bowman; *Permanent Secretary,* Forest R. Moulton; *General Secretary,* Otis W. Caldwell; *Treasurer,* C. Carroll Morgan; *Assistant Secretary,* Sam Woodley.

Executive Committee: Burton E. Livingston, *Chairman;* Roger Adams, Joseph W. Barker, Isaiah Bowman, Otis W. Caldwell, Walter B. Cannon, J. McKeen Cattell, Roy E. Clausen, Kirtley F. Mather, F. R. Moulton, and W. E. Wrather.

Membership in the Association

According to the Constitution, the objects of the Association are to promote intercourse among those who are cultivating science in different parts of America, to cooperate with other scientific societies and institutions, to give a stronger and more general impulse and more systematic direction to scientific research, and to procure for the labors of scientific men increased facilities and a wider usefulness. Members may reside in any country. A person desiring to become a member of the Association should fill in a membership application card that may be obtained from the Office of the Permanent Secretary and return it with his payment of $5.00 for one year's dues. Every member in good standing receives with his membership a subscription for either *Science* or *The Scientific Monthly.* Dues are for the fiscal year that begins October 1; the subscription begins the following calendar year. A member desiring to receive both journals concurrently may do so by paying $3.00 in addition to the regular dues. Members in good standing receive also, without extra charge, subscriptions for the A.A.A.S. BULLETIN, and they may purchase symposia publications at prepublication prices, and after publication at special prices to members.

A person who pays $100 during one fiscal year may be elected a life member; sustaining members pay $1,000. Both classes are exempt from the payment of further dues but are entitled to all the privileges of membership.

An incorporated scientific society or institution or a public or incorporated library may become a member by paying the entrance fee of $5.00 in addition to the dues. Such institution members are entitled to the same privileges as individual members.

Members are encouraged to nominate for membership persons who desire to cooperate in carrying out the objects of the Association. Names may be sent to the Office of the Permanent Secretary at any time. In the letter of invitation to become a member of the Association the name of the person making the nomination is ordinarily mentioned.

Changes of Address

New addresses for the Association's record and for mailing the journals *Science* and *The Scientific Monthly,* as well as the A.A.A.S. BULLETIN, should be in the Office of the Permanent Secretary, Washington, D. C., at least two weeks in advance of the date when the change is to become effective.